REMARKS

This Amendment is submitted in response to the Office Action dated 30 June 2005, the time to respond being until 30 September 2005. Reconsideration and allowance of this application are respectfully requested. Claims 1-~~10~~ 6 remain pending in the application. RWL 9/28/05

The Examiner has required specific information reasonably necessary for the examination of this application, which information follows.

1. The "Power saving routing algorithm" is a method for increasing a lifetime of a whole Ad Hoc Network by selecting a path minimizing the power (energy) consumption by controlling power when a routing path among nodes is set in the Ad Hoc Networks, or by routing through other nodes in case there is a node of less power consumption on the routing path, the theory of which can be found in *Ivan Stojmenovic, Xu Lin, "Power-Aware Localized Routing in Wireless Networks, " IEEE Transaction on Parallel and Distributed Systems. Oct. 2001 and JaeHwan Chang, Leandros Tassiulas, "Energy Conserving Routing in Wireless Ad-hoc Netwosks, " IEEE INFOCOM 2000, respectively.*

2. The "RM" and the "HCB" denotes power (energy) models consumed for in nodes and are abbreviations coined by the model proponents, the theory of which can be found in *Heinzelnman, A. Chandrakasan and H. Balakrishnanm Energy-efficient routing protocols for wireless microsensor networks, Proc. Hawaii Int. Conf. On System Sciences, an. 2000* and Y. *Rodoplu and T.H. Meng, "Minimum energy mobile wireless networks, IEEE Journal on Selected Areas in Communications, Vol. 17, No. 8, August 1999, 1333-1344,* respectively.

3. The concentric circle in the present invention is a circle made in terms of a final destination node and used to express a distance between an unspecified node and a final destination node (i.e. the final node in the routing path data should reach). Also, the concentric circle is specifically configured to include a directional concept for selecting an intermediate node between a source node and a destination node because the method disclosed in *Stojmenovic*

el al, supra, may increase the power consumption of other systems due to lost direction, if a node simply to consume a minimum power is selected.

4. The optimal integer *n* denotes an optimum number of a routing hop (the number of nodes in the midst of routing) for minimizing the power consumption if a distance between a source node and a destination node and a transmission distance with the maximum power output are determined. The theory of the optimal integer is given in *Ivan Stojmenovic, Xu Lin, "Power-Aware Localized Routing in Wireless Networks, " IEEE Transaction on Parallel and Distributed Systems, Oct. 2001.*

We enclose copies of the background publications cited above.

The Examiner rejected claims 1-6 under 35 U.S.C. 112 for failure to enable one to make and/or use the invention. According to the Examiner, Applicant has failed to point out how the optimal integer *n* is derived and the significance of the concentric circle. Applicant maintains that the "optimal integer "*n*" is amply described in the "Background of the Invention" of the present invention, page 4, lines 8-15, and its derivation is there stated and well-established, being published in *Ivan Stojmenovic et al, supra.* To resolve any ambiguity Applicant has herein amended page 4, lines 8-15 to explain that the optimal integer n denotes an optimum number of a routing hop (the number of nodes in the midst of routing) for minimizing the power consumption if a distance d between a source node and a destination node and a transmission distance with the maximum power output are determined. With regard to the significance of the concentric circle, the above explanation notes that the concentric circle in the present invention is a circle made in terms of a final destination node and used to express a distance between an unspecified node and a final destination node (i.e. the final node in the routing path data should reach). Also, the concentric circle is specifically configured to include a directional concept for selecting an intermediate node between a source node and a destination node because the method disclosed in *Stojmenovic el al, supra,* may increase the power consumption of other systems due to lost direction, if a node simply to consume a minimum power is selected. The present specification fully and clearly describes and claims "a second

step of setting n-1 concentric circles that have the destination node as their center and dividing a distance d between the source node and the destination node by n". The significance of the concentric circles is depicted in FIG. 5 and explained as a means (geometric artifice) for selecting candidate nodes, which are located within a predetermined distance from the concentric circle closest to the current execution node in the direction of the destination node. It is hoped that this resolves any ambiguity sensed by the Examiner and since the significance is really an analysis tool, the tool itself being described and exemplified, no further explanation is required.

The Examiner also rejected claims 1, 2 and 4-5 under 35 U.S.C. 103(a) as being unpatentable over the Stojmenovic el al. article in view of Fujita (6415161). According to the Examiner, the Stojmenovic el al. article teaches each step of the claimed invention with the exception of the second step of setting n-1 concentric circles and dividing distance d between source node and destination node by n. The Examiner contends that this step is suggested by Fujita '161. Stojmenovic el al. does teach a step of dividing a distance between the source node and the destination node by n. However, if an intermediate node is not precisely set at a point divisible by n between the source node and the destination node, the power consumption cannot be minimized. In other words, power consumption can never be minimized if a selected intermediate node is not in the direction of the destination node, regardless of n-dividing. This is important because the nodes are distributed at random. Thus, if the method of Stojmenovic et al is actually applied, the direction for a predetermined routing path might be moot. On the other hands, the present invention discloses the steps of dividing a distance between the source node and the destination node by n and selecting an intermediate node consuming minimal power placed at the direction of the destination node. *Candidate nodes located in the direction of the destination node are selected first, and the intermediate node is selected there among.* This is accomplished by selecting the candidate node using the concentric circle relative to the

destination node. Thus, with regard to claim 1 Stojmenovic et al. does not teach or suggest step (b), namely, "setting n-1 concentric circles that have the destination node as their center and dividing a distance d between the source node and the destination node by n", nor step (d) wherein the "current execution node selects nodes located within a predetermined distance from the circle that is closest to the current execution node in the direction of the destination node as candidate nodes, and selects a node for which power consumed between the node and the current execution node is minimum from the candidate nodes as an intermediate node". All intervening and subsequent steps depend on this approach to achieve the desired result.

Fujita discloses a radio cell station controller with a distance measuring section for measuring a distance from the radio cell station to a personal mobile station, and a transmitter selecting section for selecting between transmitters based on the distance measured by the distance measuring section. While Fujita loosely discloses picking between high- or low-power transmitters based on "zones", this is only to the extent that a lower power transmitter will be selected if the personal mobile station 32 is (by measuring its signal strength) within the low-power signal transmitting area (thereby saving power). This is far short of the quantitative analysis of the present invention which, by contrast, divides the distance between the source node and the destination node by n and selects an intermediate node consuming the minimized power placed at the direction of the destination node. Again, candidate nodes located at the direction of the destination node are selected first, and the intermediate node is selected there among. This approach guarantees closeness to the final destination node whenever a node passes a hop and a routing path is set, primarily because the approach accounts for directional information. Fujita does not, nor the concentric circle analysis. Indeed, neither Stojmenovic et

al. nor Fujita teach or suggest step (b), namely, "setting n-1 concentric circles that have the destination node as their center and dividing a distance d between the source node and the destination node by n", nor step (d) wherein the "current execution node selects nodes located within a predetermined distance from the circle that is closest to the current execution node in the direction of the destination node as candidate nodes, and selects a node for which power consumed between the node and the current execution node is minimum from the candidate nodes as an intermediate node", and since all intervening and subsequent steps of claim 1 depend on this approach to achieve the desired result, it is believed that claim 1 is patentably distinguished.

Claims 2 and 4-5 depend from claim 1, include the same above-described limitations, and are likewise patentably distinct.

Applicant acknowledges and appreciates the Examiner's indication that claims 3 and 4 would be allowable if rewritten in independent form, but in view of the above remarks believes that the existing independent claim 1 is patentable in current form.

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In view of the above amendments and remarks, it is believed that this application is now in the proper condition, and a Notice of Allowance is respectfully requested.

Respectfully submitted,

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